

334-CD-610-002

## **EOSDIS Core System Project**

# **6B Science System Release Plan for the ECS Project**

August 2000

Raytheon Company  
Upper Marlboro, Maryland

# **6B Science System Release Plan for the ECS Project**

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# Preface

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This document is a formal contract deliverable with an approval code 1. It requires Government review and approval prior to acceptance and use. This document is under ECS contractor configuration control. Once this document is approved, Contractor approved changes are handled in accordance with Class I and Class II change control requirements described in the EOS Configuration Management Plan, and changes to this document shall be made by document change notice (DCN) or by complete revision.

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# Abstract

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This document is the second version of 6B Science System Release Plan for the ECS project. It documents the ECS approach for completing the development of the SDPS Release 6B system. This document incorporates ECS 00-007, contract reference # 214.6, ESDIS comments to the previous version of 6B SSRP that was delivered in March of 2000. Additionally, changes are provided in Mission Requirements, ESDT Requirements, Release Capabilities, GFI, and WorkLoad Specification reflecting deferral of CHEM-1 requirements. Finally, modifications are made to Appendix B, L3 and IRD Requirements, to document the 6B exclusive requirements.

**Keywords:** Release 6B, SSRP, Release Planning, Release Capabilities, Release Requirements

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# 1. Introduction

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## 1.1 Identification

This document provides the 6B Science System Release Plan for the ECS project, which is defined by Data Item Description (DID) 334/DV1.

## 1.2 Scope

The 6B Science System Release Plan documents the definition, implementation, and development of the ECS SDPS Release 6B system. Release 6B is the last planned release for ECS under the current contract. The scope of this plan is limited to 6B and covers the following items:

- a. Capabilities to be developed
- b. F&PRS requirements to be delivered
- c. Approach to be used for NCR fixes and any known high priority NCRs planned to be delivered
- d. Overall strategy for COTS upgrade
- e. Build and drop/patch approach and known/scheduled drop/patch information
- f. Customer reviews to be conducted
- g. CDRLs to be delivered and/or updated
- h. Approach to be used for requirements verification (test approach)
- i. Schedule of key activities
- j. Progress metrics
- k. Risk mitigation plans and external drivers

The ECS Restructure Proposal for Contract NAS5-60000 provides the basis for this plan. This plan and the associated schedule will be revised, as required, based on the negotiations.

## 1.3 Purpose

The 6B Science System Release Plan (SSRP) for the ECS Project documents the ECS approach for releasing the 6B Science System. This plan describes: the capabilities to be addressed by 6B; the process for defining requirements, designing, developing, integrating, verifying, reviewing, monitoring, and statusing all products defined under the Restructure Proposal for 6B; and the known issues and risks.

The purpose of this plan is to provide the approach for and the road map to releasing 6B system. This is a working plan and, as it becomes necessary, it will be updated to reflect the latest approved changes. This document is designed to complement the existing management tools such as Primavera.

## **1.4 Status and Schedule**

This document provides ECS's plan for 6B as of two weeks prior to the publication of this document. It is essential to understand that as the 6B system development progresses, some elements of this document may change, e.g., defect analysis may require modification or relaxation of certain elements specified by this document (such as requirements associated with 6B). Any changes requiring contract modification will be captured after ESDIS approval.

## **1.5 Document Organization**

Section 2 provides the related documentation. Section 3 responds to the specific CDRL requirements.

## 2. Related Documentation

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### 2.1 Parent Documents

Parent documents are documents from which the Science System Release Plan's scope and content are derived.

803-RD-025	Mod 86, The ECS Restructure Proposal for Contract NAS5-60000 Mod 100, Definitization of the Restructure and Incorporation of CCRs
423-41-01	ECS Statement of Work
423-41-02	Functional and Performance Requirement Specification for the Earth Observing System Data and Information System (EOSDIS) Core System
ECS 999-TR-951-024R	NAS5-60000, Delivery Schedule

### 2.2 Applicable Documents

The following documents are referenced within this Science System Release Plan or are directly applicable, or contain policies or other directive matters that are binding upon the content of this volume.

308-CD-001	ECS SDPS Software Development Plan (SDP)
334-CD-510	5B Science System Release Plan for the ECS Project
334-CD-600	6A Science System Release Plan for the ECS Project
335-CD-002	ECS COTS Deployment Plan, Volume 2
211-TP-005	Transition Plan 4PX to 4 PY, 4PY to 5A, and 5A to 5B for the ECS Project, Technical Paper
223-WP-001	Operating System Upgrade Plan for SGI Machines in ECS

### 2.3 Information Documents

#### 2.3.1 Information Documents Referenced

None

#### 2.3.2 Information Documents Not Referenced

None



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## 3. 6B System Development and Release

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### 3.1 Overview

This plan governs development of the 6B system release. The section first summarizes the principal functionality and performance additions to ECS for this release and then describes the capabilities to be developed, identifies requirements to be verified, and the approach for grouping of requirements in support of Ticket generation. It summarizes the development and test approach.

Capabilities planned for 6B that provide enhancements to operations include Enhanced Fault Failure Recovery. 6B Release also provides additional capabilities for users such as SDSRV Failed Acquire Notification.

On 7/11/00, ECS received Technical Directive 72, "Orbit and Attitude Support for Chemistry". ECS's response to this TD notes suspension of Aura DPREP development from ECS SDPS Release 6B baseline. Therefore, in accordance with ECS's response to TD-72, all capabilities related to CHEM-1 are deferred and thereby removed from the 6B plan

Release 6B is the last planned release for ECS under the current contract.

### 3.2 Requirements

#### 3.2.1 Mission Requirements

The missions supported by Release 6B are shown in Table 3.2.1-1. There are no new interfaces to be supported by Release 6B.

**Table 3.2.1-1. Release 6B Launch Highlights**

Satellite	Launch Date	SSI&T	Operations Version	6B Performance Capabilities
Landsat-7	15-Apr-99	N/A	4 or later	Full Ingest & Archive
Terra	18-Dec-99	4 or later	4 or later	Full Ingest & Archive for Processing & Reprocessing
Meteor/ SAGE III	TBD	SIPS I/F Testing	4 or later	Full Ingest & Archive for Processing & Reprocessing
FOO/ ACRIM	20-Dec-99	SIPS I/F Testing	5A or later	Full Ingest & Archive for Processing & Reprocessing
Aqua	31-Dec-00	5B (6A for MODIS)	6A	Processing (1X for L1 and higher ) and Reprocessing (1.2X for L1 & 0.65X for higher level)
ICESat GLAS	30-Jul-01	SIPS I/F Testing	6A	Ingest and archive for Processing (1.2X for L0, 1X for L1 and higher) and Reprocessing(1.2X for L1 and 0.65X for higher level)

### 3.2.2 ESDT Requirements

There are no additional ESDT's planned to be developed for Release 6B.

### 3.2.3 Capacity Requirements

Table 3.2.3-1 provides the capacity requirements for 6B. Note: Baselined Capacities are provided for the end of contract (October 2002).

**Table 3.2.3-1. 6B Capacity Requirements**

	Archive Volumes (GB/Day)	# of Granules (#/Day)	Processing Power (MFLOPS)	
EDC	635	8199	1650	
GSFC	1174	9419	8340	
LaRC	240	1673	9683	
NSIDC	68	2783	100	
	Archive Volumes Cumulative (TB)	# of Granules Cumulative (000s)	Distribution	
			Network (GB/Day)	Tape (GB/Day)
EDC	844	10279	297	262
GSFC	1411	10346	533	533
LaRC	379	3275	137	137
NSIDC	64	2591	23	23

### 3.2.4 Release Capability Requirements

Release 6B is being developed based on a set of Release Capabilities (RC's). These RC's are defined in support of operational readiness for new missions and enhancement of existing capabilities in use by operations. The following provide RC's and their summary description for 6B:

1. **SDSRV Failed Acquire Notification** – Provide notifications to users via email when acquires fail.
2. **Ingest of 6B Data Types** –The SIPS interface will be used to ingest higher-level products produced on SIPS systems, i.e., additional DAS “First-Look” and “Late-Look” products.
3. **Enhanced Fault Failure Recovery** – Provide the capability to failover from primary to backup machines in the event that there is a failure of a primary machine. (Automated failover recovery capability is pending upon the outcome of ECS's RMA analysis study.)
4. **SDSRV Results Set Chunking** – Provide capability to return search results to the V0 Gateway in parts to improve overall throughput and reduce amount of time needed for users to receive search results.
5. **SDSRV Request Priority** – Provide performance enhancements to support the capability for operators to change the priority of a request.

### 3.2.5 Requirements & Criteria for System Verification Development

The F&PRS contains all of the Level 3 (L3) requirements that are to be developed by ECS. The allocation of 6B L3 requirements and requirement interpretations are provided in Appendix B. Additionally, IRDs provide the external interface requirements for ECS. The list of 6B IRDs is also included in Appendix B. This section defines the process for further analysis of these requirements and generation of tickets.

Initially, Systems Engineering allocates L3 requirements to RC's, maps IRD's to L3's, and develops operations concept. Systems Engineering then performs a detailed requirements analysis which includes working with Development to derive 6B Level 4 (L4) requirements from the current L3 requirements. These L4 requirements are mapped to the 6B L3 and IRD requirements. Additionally, Systems Engineering generates a set of verification tickets. These verification tickets are structured to group requirements (L3's, IRD's, and L4's) for logical testing and establish a complete set of Acceptance Criteria (AC) against which test cases should be evaluated to verify that these groupings of requirements are satisfied by the system. When all of the Acceptance Criteria in a ticket are verified, the ticket and its associated requirements are considered verified by association. The process for reviewing and approving requirements and tickets is the same as process explained in the 5B SSRP document.

The Table 3.2.5-1 provides the mapping of Release Capabilities to Tickets.

**Table 3.2.5-1. Mapping of Release Capabilities to Tickets**

<b>Ticket ID</b>	<b>Ticket Title</b>	<b>Release Capability</b>
EN_6B_01	SDSRV Failed Acquire Notification	SDSRV Failed Acquire Notification
EN_6B_02	SDSRV Priority	Request Priority
EN_6B_03	SDSRV Results Set Chunking	Results Set Chunking
RH_6B_02	Ingest of 6B Data Types	Ingest of 6B Data Types
RM_6B_02	Enhanced Fault Failure Recovery	Enhanced Fault Recovery-Failover
SL_6B_01	GSFC 24-Hour Workload Performance	Processing 6B System throughput
SL_6B_02	EDC 24-Hour Workload Performance	Processing 6B System throughput

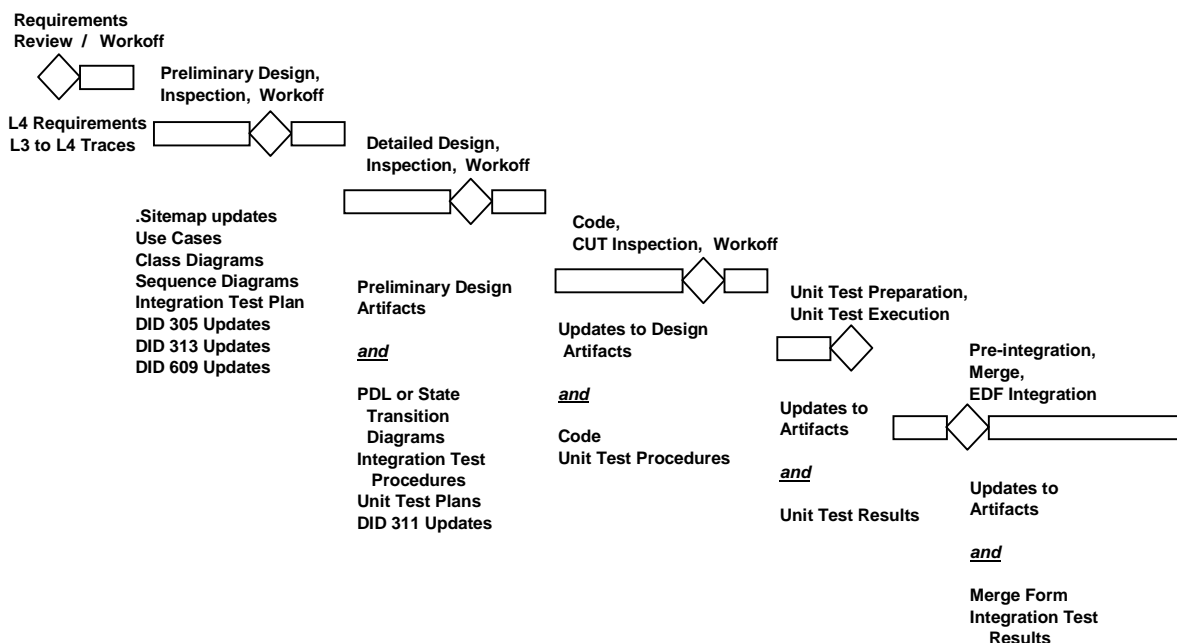
### 3.3 Software Design, Development, and Integration

The ECS SDPS Software Development Plan (SDP), DID 308-CD-002-007, defines the steps by which the development of ECS SDPS software will be accomplished and the management approach to software development. The SDP addresses software processes, methods, organizational responsibilities, tools, configuration management, software quality, and other activities relevant to accomplishment of the ECS SDPS statement of work. ECS software development is based on a set of Development Capabilities. The Development Capabilities are derived from Release Capabilities.

Development of each capability involves activities that follow a water fall life cycle as shown in Figure 3.3-1. Each phase of development (Requirements, Preliminary Design, Detailed Design, Code, Unit Test, and Integration) consists of an activity, followed by a peer review (the milestone shown in the figure) of the outputs, and a workoff period for any issues discovered

during the peer review. Each of the phases has a set of required artifacts (shown underneath the milestones) that are specified in Development Program Instructions. All of the activities shown are scheduled and maintained in Primavera as part of the overall system schedule.

At or soon after IRR, Development provides a draft Integration Test Plan, as well as drafts of the updated versions of DIDs 305, 313, and 609, in order to ensure that there is a broad understanding of the functionality to be delivered in the release.



**Figure 3.3-1. Capability Development and Integration Approach**

### 3.3.1 NCRs

ECS plans to separate the 6B code baseline from the 6A baseline on or about 16 October 2000. After this separation, the 6B code baseline will continue to receive fixes for NCRs observed in the 5B and 6A code baselines. Historically, the expected work-off rate of these NCRs is approximately 100 per month. With delivery of 6B to the DAACs in April 2001 (CSR date is 3/30/2001), approximately 500 NCRs are expected to be fixed or closed to the 6B code baseline. In addition to the NCRs incipient to the 5B and 6A code, NCRs resulting from the development of 6B code will also be fixed during this time period. The 6B-based NCRs are expected to number approximately 25, based on established software lines of code.

### 3.3.2 Release 6B COTS Changes

ECS has well defined procedures covering the life cycle of upgrading COTS products. The process includes the requirements process that will initiate an upgrade activity, the reviews and sign off review boards utilized along the way as checkpoints/milestones to ensure accuracy, adequate verification, and coordination with all ECS segments, customer activities, and DAACs that will be the recipient of the upgrades.

The CCR process is the key activity providing the reviews/system checks to ensure performance and system validation standards are met. These begin with the procurement of the upgrade and the introduction of the upgrade into Development's domain for analysis, installation, and test within the IDG Cell and the Functionality Lab. Upon Development organization satisfaction, the product is ready for testing by System Test in the VATC. System Test selects the appropriate tests, and the installation is coordinated with the Infrastructure organization. Satisfactory completion of the VATC activities results in the product being prepared for a Pre-Ship Review (PSR). The PSR verifies that all testing and performance milestones have been met and installation instructions prepared and checked out before the product is released for delivery to the customer. A release CCR is generated to accomplish this release. ECS PI CM-1-005 describes the procedures for turnover and installation of COTS products.

The COTS products that are included in Release 6B were selected for inclusion for the following reasons:

- § Vendor discontinuing support for a particular version
- § Product being upgraded to fix 'Bugs'
- § Product being upgraded because of cross dependency on another COTS product upgrade
- § Release functionality requirements associated with Release 6B

The identified COTS products for different releases are listed in DID 335, ECS COTS Deployment Plan, Version II. As DID 335 Section 1.4 states, some elements of this document may change, i.e., additional products may be identified for upgrade. Status including changes on all COTS products is reported and delivered to ESDIS on a weekly basis. This weekly report includes list of all COTS products planned for delivery during 6B release timeframe. Currently, no major upgrades for COTS products or Operating Systems are planned for 6B. However, ECS has identified a risk with the end of support for Sun Solaris environment COTS that can force Solaris upgrade during 6B development life.

Upgrades to the ECS hardware configurations are planned for the 6B timeframe. These include hardware which were deferred due to TD 64 and 65 and miscellaneous capacity upgrades.

Table 3.3.2-1 provides some of the major hardware upgrades for SPR and DRP subsystems.

**Table 3.3.2-1. 6B Hardware Upgrades**

Site	Subsystem	Mission	Server
GSFC	SPR	Terra	SGI Origin
LaRC	SPR	Terra	SGI Origin
EDC	DRP	Terra	SGI Origin
GSFC	DRP	Aqua	SGI Origin
GSFC	DRP	Aqua	Sun Ultra 10
LaRC	DRP	Aqua	SGI O2

### 3.4 Test Approach

The ECS Test Engineering organization reflects teams that are oriented to the major ECS system development functions of System Infrastructure, Planning & Data Production, Data Archiving & Distribution, and Interoperability, while retaining individual subsystem coverage within the teams. This system orientation aligns well for testing to specifications containing the acceptance criteria for major system functions (Tickets) that cross subsystem boundaries. The acceptance testing will have a distinct system perspective for 6B. Additionally, the test organization is very well aligned with the ECS Software Development organization, permitting clear linkage between test engineers and their software counterparts; test engineering participation in software requirements, preliminary design, and detailed design reviews; and collaboration on appropriate test approaches to ensure full test coverage between the organizations.

The objective of the ECS formal Acceptance Testing activity is to verify that the Release 6B software is compliant with the Level 3 requirements through verifying satisfaction of Acceptance Criteria specified in the verification Tickets. Table 3.4-1 provides a mapping of 6B test cases to Tickets. Additionally, regression testing will be performed for each new release of the custom software and for each software patch issued.

**Table 3.4-1. Mapping of Test Cases to Tickets**

Test Case	Ticket
6B10020 - SDSRV Failed Acquire Notification	EN_6B_01
6B10030 - Request Priority	EN_6B_02
6B10040 - Results Chunking	EN_6B_03
6B09020 - Ingest of 6B Data Types	RH_6B_02
6B08010 - Enhanced Fault Recovery-Failover*	RM_6B_02

\* On hold pending RMA study

Major Test Engineering milestones for 6B are the 6B IRR, TRR, CSR, and SRAs. After Turnover of the 6B custom software to test, the test program will proceed in sequential phases (see following) marked by key activities, reviews and documentation. The reviews (both internal and external) and documentation provide a forum for status and progress of the Acceptance Test program.

**Phase 1: Development of Test Plan.** This effort is built upon the following sources of information:

- This Science System Release Plan
- The Requirements Verification Traceability Matrix (RVTM) captured in ESDIS's Verification Data Base (VDB)
- Requirements and Acceptance Criteria specified in the Tickets
- Participation in the Development organization's requirement reviews, preliminary design reviews, detailed design reviews, and integration activities.

As the predecessor step in the Test Planning process, the Systems Engineering organization's Architect Office (AO) generates the Tickets, populating the VDB with RC's, Level-3 requirements, Interface Design Specifications, Level-4 requirements, and Acceptance Criteria. The VDB also provides the traceability between these items.

The HW and SW environments are analyzed to determine the expected fidelity of testing in the VATC and PVC, and to identify any test that, due to the nature of the acceptance criteria or lack of Test Facility resources, will need to be verified in one or more of the DAAC environments.

Test Engineering allocates the 6B Tickets generated from the VDB data to the various test development teams. The test teams then generate the test case descriptions needed for the ECS Science Acceptance Test Plan (DID 409/VE1), published in draft form by IRR.

The Test Plan provides:

- A presentation of the 6B Acceptance Testing methodology.
- A list of Test Cases, including, the objective and a summary of each test, and identification of test inputs, test outputs, and test configuration.
- A mapping of Test Cases to the Acceptance Criteria specified in the tickets.
- The criteria for acceptance of each test case.

**Phase 2: Refinement of Test Plan and Development of Test Procedures.** In addition to review of the 6B Tickets, test engineers participate in requirements reviews, Preliminary Design Reviews (PDRs), and Detailed Design Reviews (DDR). They also interact with software developers during integration test development, as well as participate in integration test reviews and conducts. Early involvement with and support to the Development team permits the test engineers to gain an understanding of the functionality and associated 6B software implementation.

Acceptance test procedures are produced by first developing a high level flow of the test sequence, followed by a functional description of test actions, and then completed by the detailed test actions. Test Engineers also determine test dependencies, interactions, and sequences. As each test procedure is produced, it undergoes internal review (including a peer review presentation) and update before it is submitted to the Government for review as a component of the ECS Science Acceptance Test Procedures (DID 411). It is then processed for comment and approval.



This phase completes with a Test Readiness Review (TRR). TRR is predicated on successful installation and checkout of the 6B software in a dedicated mode(s) in the test facility for formal testing, as well as the availability of test data, tools, and resources.

**Phase 3: Execution of the Test Plan in Landover.** Following a successful TRR, Government approved acceptance tests are dry run. After the dry run, the test cases are formally conducted with witnesses present to verify satisfaction of specified Acceptance Criteria.

External interfaces are exercised in the test environment under conditions that simulate an operational environment, to the extent possible. In cases where it is not possible to achieve the necessary level of fidelity in the test facility, formal sell-off of acceptance criteria will occur in one or more DAAC environment(s), as described in the Test Plan.

Regression testing will be conducted to ensure that existing software is not adversely affected by new custom software. Regression tests are developed as functional thread tests from the repertoire of previous acceptance tests and end-to-end tests.

After acceptance testing and verification of the software, this phase concludes with a Consent-to-Ship Review (CSR). The CSR documents the results of the test program, including acceptance criteria verification status, liens associated with the release, and a lien work-off plan if needed. A successful CSR documents approval by the ECS Program and ESDIS to deploy the Release 6B software to the DAACs

**Phase 4: Execution of the Test Plan at the DAACs.** Before deployment of the release, ECS ensures close-coordination with each DAAC to plan the on-site delivery. This includes on-site ECS/Landover support for release 6B installation and checkout. The deployment of Release 6B is performed in accordance with the 6B Transition Plan.

Following CSR, the software is shipped to the DAACs. The ECS test team is on call to support the Transition team to aid the DAAC staff, install the release and perform site Integration and Checkout (ICO) in a test mode (nominally, TS2). The subsequent site testing, lead by the DAAC personnel, focuses on regression testing and DAAC-specific Launch-Critical and Launch-Essential scenarios. Also of concern are configuration issues that must be identified and resolved prior to operations. In general, this is not an extension of acceptance testing although there may be cases where specific acceptance criteria and interfaces must be tested at the DAAC.

DAAC testing occurs over an extended period to allow DAAC staff to gain experience with a new release prior to transition to operations. From a schedule perspective, ICO is a planned two week activity for existing DAACs.

This phase concludes with a final (joint) Site Readiness Assessment (SRA) for each DAAC to review the completion of the test program at all DAACs. At the SRA, the results of site testing are documented.

The ECS Science Acceptance Test Report (DID 412/VE2), which formally documents the results of the acceptance testing, is published within one month following the final SRA.

### **3.4.1 Test Procedure Development Process**

Test Engineering assigns resources to each expected Ticket containing the requirement groupings and acceptance criteria. As Tickets are developed, the Architect Office (AO) provides them to the Test Engineering organization. The initial development of test cases starts with the issue of the draft Ticket. Test Engineering generates the test case summaries as a component of the Test Plan.

Test engineers participate with software developers in requirements reviews, Preliminary Design Reviews (PDRs), and Detailed Design Reviews (DDRs). They also interact with software developers during integration test development, as well as participate in integration test reviews and conducts. Early involvement with and support to the Development team permits test engineers incorporate lessons learned from integration testing into test case development, as well as to gain an understanding of the capabilities and implementation represented in 6B software.

Test Engineering refines the test cases as the Tickets are updated and reviewed internally and by ESDIS. Development of each draft test case continues until complete and ready for review. The responsible test engineer generates an internal review package. A peer review presentation is conducted for representatives from the Architect Office, Software Development, Operations, and Test. After the peer review, the test case is updated per review comments and posted to the web site, and ESDIS is notified that the test case is ready for Government review. ESDIS reviews the test procedures and provides comments. The responsible test engineer updates the test procedure, which is then reposted to the web site. ESDIS makes a final review and then approves the test procedure.

### **3.4.2 System Verification Process**

At the completion of Release 6B integration in the Engineering Development Facility (EDF), turnover of the software release from Development to the Test Engineering organization will occur. After turnover, installation and checkout of the turnover software in the Test Facility will be accomplished. Regression testing, described in Section 3.4.3, will occur after installation and checkout.

Upon completion, a TRR will be held. The TRR is an internal review under the control of the ECS Test Engineering team and ECS contractor management. The TRR baselines the Government-approved revisions/comments to the test cases. The TRR also establishes the day by-day sequence of tests to allow for a metrics-based analysis of test program progress.

This TRR gate will be monitored to ensure that 1) all integration has been successfully completed; 2) all necessary documentation or installation procedures needed are available; 3) a successful installation and checkout has occurred; 4) and any other important information is communicated to or by the Test Engineering Organization prior to the start of formal testing.

After successful TRR of turnover software, the test cases will be dry run. Upon successful dry run of a test case, the acceptance test will be formally conducted before a government witness in accordance with Test Engineering project instructions and work instructions, including execution

of a test, test conduct documentation, and gathering test artifacts. All formal acceptance test conducts are coordinated with ESDIS in advance.

### **3.4.3 Regression Testing**

The purpose of Regression Testing is to exercise the major functions of ECS to provide confidence that the addition of new custom or COTS software does not adversely affect the behavior of unmodified code. The Regression Test Plan provides an overview of the methodology used for the selection, development, and execution of Regression Test activities to be used for 6B.

Regression Test activities are based on normal production scenarios that will exercise ECS functionality. These activities tailored to each facility and shall contain the following:

- Test Checklist - The purpose of Test Checklists is to provide a list of functional system threads for each subsystem
- Representative sample of tests that will exercise software functions
- Additional tests that focus on software functions likely to be affected by a new release/update
- Tests focusing on software components that have changed

The regression activities are based on the functional threads found in the checklist. These threads will compose a scenario beginning with ingest, archive, and production, and ending with search, order, and distribution. This scenario is designed to test the basic functionality of the system after a release or patch is installed. By running this test each time, expected results form a baseline for future regression testing of the system. In addition to the Insertion-Production-Retrieval scenario, several other threads will be developed based on related functions not tested in the core scenario. These threads will be tested only if the new functionality may affect it.

Finally, new functions that are delivered with each new drop or patch will be analyzed, and a determination will be made as to which components could be affected by the new software. Existing regression test cases will be updated to include the new functionality.

Regression testing will be performed after each new software release. Regression testing will also be performed at the DAACs after installation and checkout of 6B after CSR. These regression tests will be tailored to include test cases that exercise specific capabilities of interest to the DAAC, in addition to the general capabilities of the 6B software.

### **3.4.4 Site Testing**

The ECS System Engineering Transition Team will coordinate with each DAAC to plan the on site delivery of 6B software, including ECS/Landover support for installation and checkout and the transition in operations from 6A to 6B. Deployment of Release 6B is performed in accordance with the 6B Transition Plan.

The ECS Test Team is on call to support and assist the Transition Team wherever needed. The DAAC staff will install the release, then perform integration and checkout in a test mode with the advice and support of the ECS Transition Team staff. Subsequent site testing is the responsibility of the DAAC personnel and includes regression testing tailored for the particular DAAC, with DAAC-specific scenarios.

This testing is generally not an extension of acceptance testing, however, there may be cases where specific acceptance criteria and interfaces must be tested at the DAAC because environmental resources at the Landover test facility could not support the testing.

The details of the on-site activities, such as testing the upgrade of shared modes and transition and rollback testing can be found in the Transition Plan.

### **3.4.5 End to End Testing**

ECS plans to perform on-site End to End (ETE) testing for those sites where no testing has been performed earlier. Since no new DAACs are introduced for 6B, ECS has no plans for any Release 6B ETE testing at any of the existing DAACs. ETE testing is conducted as part of regression testing as explained in Section 3.4.3.

### **3.4.6 Performance Testing**

Release 6B performance verification will consist of executing two 24 hour sustained operation tests using workloads that approximate the required loads for the Release 6B deployment timeframe. These tests will be self-contained and not use external interfaces. The success criteria will be the demonstrated ability of the system to execute each workload within a 24-hour period.

For Release 6B, GSFC and EDC DAAC workloads have been selected since they have the largest throughput rates. The workload specification is contained in Appendix A.

The workload specification has been derived from the SOW and F&PRS requirements for mission support, capacity phasing, and catch-up rates. The workloads use granule sizes, granule counts and PGE execution frequencies as defined in the ECS technical baseline. At its discretion, ECS will use synthetic data/PGEs, real data/PGEs, or a combination to implement the workload.

Performance Verification will be performed in the Landover Performance Verification Center (PVC). It is anticipated that the PVC will not provide sufficient capacity to fully test performance in all areas. The likely areas of reduced capacity are:

- fewer science processor CPU's and processing disks than the largest DAAC;
- fewer silos and archive tape drives than the largest DAAC; and
- fewer physical media distribution devices than the largest DAAC.

In this case, the workload specification will be adjusted to be consistent with the PVC hardware and network capacity. For example, PGE execution times may be shortened to permit execution of full processing chains on a smaller number of CPU's. This approach will permit verification

of the system's ability to plan and schedule the required number of PGEs per day on a smaller science processor configuration than would be required if baseline PGE execution times were used. Any changes required to the workload specification will be identified in an update to this document.

In order to reduce hardware, test development and execution costs, performance verification of secondary and/or low rate functions will not be performed. These functions include: failure recovery, failover, user registration; user profile update; user profile replication; user login; DAR submit; DAR status; directory search; GDS gateway requests; expedited data processing and distribution; ancillary data ingest from minor sources; and operator functions not related to core ingest, archive, production, and distribution.

Performance verification will be performed over a six-week period as shown in the schedule contained in Appendix E. The first representative DAAC workload will be executed during the first week of testing. The second representative DAAC workload will be executed during the second week of testing. The third and fourth weeks will be spent working on performance related NCR fixes and tuning activities. The two tests will then be rerun during the fifth and sixth weeks. The tests will be performed in OPS mode. No activity will occur in TS1 or TS2 during the tests. Appendix A provides the 6B Workload Specification as of the date of this SSRP. The official Workload Specification is maintained in the VDB and the current version can be accessed on the System Verification web page at <http://ecsv.gsfc.nasa.gov>.

### **3.4.7 COTS Testing**

COTS packages are delivered in various ways – some COTS software packages are delivered with the ECS custom software and have an associated Ticket (including acceptance criteria), and others are delivered as autonomous upgrades to existing COTS software packages that are not part of the custom software delivery process. The latter are handled through the COTS Pre-Ship Review (PSR) process.

For each COTS package having an associated Ticket and delivered along with the ECS custom software, Test Engineering, via established process for custom software, develops new test cases.

For each COTS software upgrade not part of custom software delivery, the Test Engineering organization executes one or more tests to exercise system functionality and the COTS software upgrade package.

If a test case does not yet exist, Development organization or Raytheon Technical Services Company (RTSC) engineers develop a test case and provide it to Test Engineering. Regression Testing is performed on all COTS upgrades delivered to the VATC.

RTSC engineers install in the VATC, configure and checkout all COTS package upgrades. Thereafter, the ECS Test Engineering organization executes one or more tests to exercise system functionality that interfaces with, depends upon, or otherwise utilizes the COTS package.

Satisfactory completion of the VATC testing activities results in the product being prepared for a Pre-Ship Review (PSR). The PSR verifies all testing and performance milestones have been met, installation instructions prepared, and checked out before the product is released for

delivery to the customer. A CCR is generated to accomplish this release. ECS PI CM-1-005 describes the turnover and installation of COTS procedures.

## **3.5 Transition**

### **3.5.1 Transition Strategy**

The ECS Transition IPT will coordinate with each DAAC to plan the on-site delivery of 6B release, including ECS support for installation, checkout, and transition from 6A to 6B. The Transition IPT is comprised of representatives from System Engineering, Development, Test Engineering, and M&O organization. The transition of 6B release will be performed in accordance with the “Transition Plan 6A to 6B for the ECS Project.”

The ECS transition team and DAAC staff will install the 6B release, perform integration, and conduct checkout in a test mode. Transition activities will proceed from TS2 mode, then to TS1, and finally into the OPS mode. The DAAC staff will conduct subsequent regression tests tailored for that DAAC under DAAC specific scenarios. These tests will include end-to-end test that ensures the stability of the system and 6B release associated performance test. Note: This testing is not an extension of acceptance testing.

### **3.5.2 Custom Code Transition**

The 6A-to-6B transition follows the same general approach as the 55-to-6A transition described in Section 3.1 of 334-CD-510-002. The 6A-to-6B transition goal is the reduction of the total downtime required to complete the installation and verification in the OPS mode within 48 hours or less.

To plan and perform transition, the following assumptions are made:

1. The transition is from a single baseline. That is, if the custom software for a given mode is not from a specific 6A release, then the appropriate patches will be applied to bring the release to that level before the transition is started.
2. COTS software versions match required baseline versions.
3. Full system backup and any associated incremental backup are complete and available prior to the start of transition.
4. The DAACs will either delete all unused data that is outside the ESDT baseline from the archive prior to transition, or will be responsible for updating the associated ESDTs to meet 6B requirements.
5. All producers of higher-level data products (L1 and higher) are capable of holding/buffering products that could not be ingested during the transition period.
6. Prior to shutdown the system is quiesced (work queues are allowed to run until they are empty).

7. The downtime clock starts when system inputs are disabled, and completes when the system is again receiving operational data.
8. Once operations are restored, the use of the other modes is kept to a minimum to allow backlogged processing to catch-up.

The 6A-to-6B transition will use the same basic approaches to mitigating risks as the previous transitions. The approach is based on a step-by-step process structured in such a way that the level of confidence in the delivered code and the transition scripts increases at each step.

After the successful conclusion of the acceptance test phase, the transition to 6B is practiced in the VATC for a period of about three weeks. During this time, personnel from DAACs will be trained to perform the entire transition cycle (i.e., 6A system backup, system quiesce, installation of 6B, database transition, 6B checkout, and rollback to 6A). This training cycle is repeated three times, or once a week. The transition is then practiced in either or both TS1 and TS2 modes at the DAACs. This should allow the discovery of any outstanding DAAC-specific configuration issues. Finally, the transition to 6B is accomplished in OPS mode. To reduce the overall time to transition all DAACs and minimize the personnel resource required, the current approach is to train NSIDC personnel at EDC during the EDC transition phase and train LaRC personnel at GSFC. The transition in OPS at LARC and NSIDC will conclude the 6A-to-6B transition. This approach allows for the early detection of possible bugs - and enough time to provide fixes, if needed - as well as for DAAC operations personnel to become intimately familiar with the entire transition process. This strategic approach for training DAAC personnel will be re-evaluated as the DAAC transition plans become clearer in order to ensure a transition as expeditious as possible at each DAAC and an optimized use of the technical expertise of the personnel composing the ECS transition team.

It is also well understood that a certain level of risk is potentially associated with database transition. To mitigate such a risk, any new capability or system change included in the 6B release should be evaluated relative to its database transition impact. The minimum risk obviously occurs when there are no database schema changes. The goal of the assessment would be to trade-off the benefit of the system change against the risk of the database transition. Since the impact will depend on the specifics of the change, a full assessment can only be made once the specifics are known.

### **3.5.3 COTS Transition**

A transition strategy will be developed for each of the COTS products, identified in section 3.3.2 that need to be gradually integrated into the system instead of just doing an upgrade.

## **3.6 Configuration Management Approach for PCA & FCA**

Physical Configuration Audit (PCA) is a formal assessment of the “as built” configuration to assure that it conforms to the approved baseline. The PCA will be conducted as a coordinated team effort between ECS Development, M&O, Quality Assurance, ESDIS QA, and a representative from each DAAC. ECS CM will lead the PCA effort. PCA activities will be

documented in a PCA schedule that will be reviewed with the PCA team during a kick off meeting where roles, responsibilities, and key activities will be discussed.

PCAs evaluate COTS software, OS patches, custom code, configuration parameters and hardware. These audits employ automated scripts to compare DAAC configurations against baseline documentation contained in the ECS XRP database. High and most medium priority NCRs generated during the audits will be addressed immediately to ensure the system configuration integrity. Low and remaining medium priority NCRs will be provided to the PCA team's M&O and DAAC representative for the appropriate prioritization and resolution. Prior to TRR, to ensure the integrity of acceptance testing, a COTS and OS Patch PCA is conducted for the VATC and PVC. After the custom code install at in the VATC and PVC, a custom code PCA will be conducted. The results of those audits will be provided during the CSR presentation.

Prior to PSR, a COTS and OS Patch PCA at the DAAC's and SMC will be conducted to ensure the configuration of the system is correct and will not cause testing errors. Once the custom code has been installed in the test mode, a custom code PCA will be conducted to ensure the configuration's integrity. This will require significant involvement of the ECS CM team in the transition team's activities to ensure the approved baseline documentation is appropriately updated with changes that occur during the transition. Another PCA will be conducted following code installation in the operations mode to ensure that the delivery has been installed according to the baseline configuration. All differences between the audited configuration and the final tested configuration are documented and recorded in the DID 506 which is published 30 days after the final SRA.

Functional Configuration Audits (FCAs) are formal audits of test results to assure that each ECS product meets its specified performance requirements to the extent determinable by testing. The Quality Assurance Office conducts these audits with CM assistance throughout the software life cycle.

### **3.7 Customer Reviews**

Customer reviews for 6B consist of Incremental Release Review (IRR), Consent to Shipment Review (CSR), and Site Readiness Assessment (SRA). Appendix C provides a preliminary agenda for each of these reviews.

The IRR addresses the requirements and their associated priority. It includes the design aspects of incorporating the requirements into the system, the detailed requirements and requirement verification traceability, and a draft Acceptance Test Plan. Early definition of the Acceptance Test Plan, which reflects code and unit test, integration and test efforts, and formal verification test activities ensure continuity and coherence throughout the 6B development cycle. Development will support IRR by presenting requirements and design material (ops scenarios and use cases, external interfaces, software to hardware mapping; and user interfaces ) for the major functionality in the Release 6B.

In general, the IRR is planned to precede the code and unit test activities associated with the release and provides the essential components of a combined System Requirements Review and



Design Review. A successful IRR constitutes government approval to proceed. CDRL items for the IRR are produced as required in Section 3.7. The IRR is scheduled prior to the completion of design activities, to enable early detection of design oversights and allow changes or updates to occur before coding begins. Once the requirements baseline is established, Systems Engineering provides preliminary design, detailed design, and implementation support to ensure that the system design and/or performance requirements are not compromised by design or implementation decisions. An additional task involves the generation of the operational transition plan to support migration of existent DAACs from 6A to 6B.

Following a successful TRR, an ECS internal event, the software release is installed in a dedicated mode(s) in the VATC for formal testing. Formal tests are run to verify a predefined set of system capabilities reflected in the L3 and L4 requirements. A prerequisite for formal execution of tests is ESDIS approved test procedures. This phase concludes with a CSR. The CSR documents the results of the VATC test program including requirement verification status, liens associated with the release, a lien work-off plan, and the most recent PCA results at each DAAC.

The SRAs are conducted to assess the readiness of sites. The SRAs may be planned before a site installs the release in the Ops mode. At the SRA, the status of testing and NCR verification since CSR, the results of PCA including COTS and OS patches audit for all of the modes and custom code audit on test modes, and DAAC test report and readiness are reviewed. ECS plans to conduct separate reviews for each DAAC.

### **3.8 6B CDRL List**

The documents associated with the delivery of Release 6B are provided in the Appendix D. This Appendix provides the list of 6B documents as well as the schedule of delivery.

### **3.9 Schedule of Key Activities**

The project schedule is maintained on line with the Primavera system and is compiled and delivered to the customer on a weekly basis as the weekly 447 report. Additionally, on-line access is provided to compiled project schedule in the Primavera system. Appendix E provides a high level schedule for 6B activities.

### **3.10 Progress Metrics**

Metrics are used as a management tool to assess progress, adjust resources, and aid in the delivery of ECS/SDPS. ECS program uses Earned Value Method to assess and monitor all of the ECS Control Accounts based on cost and schedule changes. Program Management in conjunction with ESDIS reviews monthly variances.

Planned versus actual metrics aid in determining progress towards the planned goals. All subsystems and disciplines use these types of metric. Other types of metrics include the rate of discovery of problems or issues, the rate of changes in code, and the rate of new code being developed. These rate metrics provide trends that predict system stability and help identify

additional potential resource needs. The Program Manager will maintain a sustained emphasis on continually improving the data collection, analysis and presentation of the relevant metrics of the project.

Selected metrics presentation charts and their updates are presented at the Daily Status Reviews (DSR), and posted for use and reference by interested individuals, and formally provided in the weekly update to the monthly program report.

Current metrics delivered each week include:

- Code & Unit Test Plan vs. Actual
- Integration Plan vs. Actual
- Severity 1, 2, & 3 NCRs Prior to 'T' State
- NCR Work-off Actuals vs. Projections
- DAAC Support Desk Trouble Tickets Open vs. Closed
- SLOC by Sub-System
- SV/AT Tests Planned vs. Actual
- Verification Progress Status, Schedules, and Variances

### **3.11 Government Furnished Information**

Presently, no GFI's are identified for 6B.

### **3.12 Risk Mitigation Plans**

#### **3.12.1 Risk Management Approach**

Achieving balanced technical/cost/schedule performance, the ECS project emphasizes risk identification and management. This section describes the program's approaches to this critical process.

PM-1-002, the Risk Management Methodology (a Project Instruction) provides the details of ECS's risk management process. This process is composed of four stages. This section provides a brief and high level description of the four stages.

**Stage 1, Risk Identification** - Risk items will be identified over the course of the Program from routine ECS activities and recorded on the Program risks list.

Any ECS personnel can identify risks with potential technical, cost, or schedule impacts and report to the management. The Management will then designate a "Responsible Individual" to lead all activities related to that particular risk. Identified risks will be moved to the Risk Assessment stage of the Risk Management Process.

**Stage 2, Risk Assessment** - Detailed analyses of the identified risks and associated drivers are performed by the Responsible Individuals.

The analyses are conducted to discover the causes, effects, and magnitude of perceived risks. They consist of determining the probability of potential risk occurrence (probability of occurrence, Pf) with respect to design maturity, system complexity, and dependency variables and evaluating all technical, cost, and schedule consequences (consequence of failure, Cf) caused by the potential risk.

**Stage 3, Risk Mitigation** - In this stage, Program Management evaluates various mitigation alternatives presented by the Responsible Individual for cost, impact, effectiveness, and feasibility and approves a mitigation plan for implementation.

The mitigation plan identifies details of mitigation activities with schedules and the supporting organizations. It also provides detailed actions with schedules for completion.

For highly significant risks, contingency plans may also be developed and documented during this stage; contingency plans address the situation where the selected mitigation might fail, and provide for documented alternate courses of actions.

**Stage 4, Risk Monitoring** - After approval of a mitigation plan for implementation, the risk management team will periodically review the status of the related risk action items and assess their progress via risk meetings. If there is any indication of an increase in the severity of the risk, the risk is referred back to the mitigation stage for further option analysis. In addition, risk metrics (impacts and probabilities) are reviewed and updated periodically.

### **3.12.2 Known Risks and Mitigation Strategies**

Threats with potential technical, cost and schedule impacts will be routinely identified and evaluated during the normal course of program execution. Based on experience with the program to date, the following risks have been identified:

1. Risk of Science Software requiring computer resources over and beyond the ECS contract baseline impacting the effectiveness of the operational systems at the DAACs.

ECS will continue to support early SSI&T of science software to determine as early in the process as possible the potential impact of science software on provided computing resources. This includes monitoring requiring CPU, memory and disk and archiving resources. This will allow time for the instrument teams to better tune/optimize their algorithms in selected cases. For instruments teams where processing is being provided externally, ECS will support early interface testing to determine potential impacts on system ingest and archiving throughput.

2. Concern about DAAC-unique configurations and software packages resulting in unexpected system manifestations.

While the system is expected to satisfy 6B criteria at each DAAC, there is concern regarding differences between versions of COTS products in the Landover Facility test environments

and each of the DAACs. This issue is due to each DAAC having its own timetable for upgrading COTS packages.

This is not a risk that the ECS program alone can mitigate. ECS will work closely with DAACs to schedule COTS product upgrades within the schedule required to maintain the baseline that supports 6B. Activities such as site unique testing, checkout testing, and transition should minimize the impact of this risk. Since the level of risk will depend on the specifics of the site differences, a full assessment can only be made once the specifics are known.

3. Ability to maintain required staffing skill mix for delivering release capabilities.

ECS continues its aggressive hiring practices. Management is regularly assessing priorities and allocation of key resources to the critical activities as well as careful coordination among internal organizations to minimize schedule impacts.

4. The risk that the selected architecture may not satisfy the RMA requirement and additional material may be needed

ECS is performing an assessment of RMA for its systems at the DAACs and is planning to perform a more accurate assessment of RMA at Release 6B. If necessary, the H/W configuration will be supplemented.

5. The risk that the SLOC will grow as the requirements are better understood and the design progresses, i.e. as L4s are prepared.

ECS is in the process of revising and improving the process for detailed requirements definition and approval. The new process, involves both the Development and Test organizations at the early stages of requirements definition to allow full understanding of the intent of detailed requirements thereby, minimizing rework.

6. Concern about unpredictability of COTS vendors upgrading or changing their products affecting ECS system.

The need for upgrading a Sun platform COTS will force ECS to upgrade Solaris 2.5.1 to 7 or 8 before 6B CSR. Presently, there are COTS on Sun platforms using Solaris 2.5.1 that have reached/are reaching the end of their support (DCE on Sun, Sybase Adaptive server, Netscape Enterprise Server, and the Sun compiler). Upgrading some of these COTS will require Solaris 2.5.1 upgrade to 7 or 8. Upgrading Solaris will require version upgrades of many other COTS as well.

ECS is in the process of evaluating alternatives to upgrading these COTS. ECS continues its aggressive policy to obtain timely information from vendors regarding their product changes and planning/updating ECS's activities based on criticality of these changes. Additionally, ECS continues its negotiation strategy with its vendors pursuing extended product support agreements if necessary.

7. Potentially, DAAC support resources will require key Development expertise for patches and fixes, thereby impacting and delaying 6B development schedules.

ECS continues to coordinate with ESDIS in prioritizing the remaining ECS development work. When necessary ECS will work with ESDIS to reschedule some of the lower priority development capabilities in favor of modifying or fixing some operational delivered capability. The consequences and schedule impacts of any of these changes will be provided to ESDIS as part of the decision-making process.

# Appendix A. 6B Workload Specification

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## A.1 Introduction

Release 6B performance verification will consist of executing a simulated 24 hour workload for the GSFC and EDC DAACs. Release 6B supports full Terra and Aqua ingest, archive, production and distribution requirements. In addition full reprocessing for Terra is supported. Reprocessing of 1.2X for L1 and .65X for L2 and higher level data products is supported for Aqua. The workloads will simulate 3X production and ingest/archive of higher level products Terra to account for both normal processing and reprocessing. 120% of level 0 ingest/archive will be simulated. The tests will be performed in OPS mode. No activity will occur in TS1 or TS2 during the tests.

This appendix contains the workload specification that defines the acceptance criteria for the performance verification test procedures. For each DAAC, an initial system state is defined, as well as ingest criteria, production criteria, planning criteria, distribution criteria, data access criteria, and system backup criteria.

Performance verification will take place in the Landover Performance Verification Center (PVC). This includes the simulation of external interfaces and the execution of test procedures against a minimally populated archive.

Some TBD items are contained in this specification. They will be resolved in a subsequent document update.

## A.2 GSFC Workload Specification

### A.2.1 Initial System State

At the beginning of the 24 hour test, the system state shall be as follows:

- a) User registrations required for the test have been performed.
- b) ESDTs required for the test have been installed.
- c) Volume group assignments have been made to mirror the volume group assignments at the DAAC.
- d) The Science Data Server inventory database has been populated with 2,500,000 granules. A small subset of these granules will have browse associated with them. These granules will be used to support the Data Access plan specified in A.2.6. The associated archive will be populated with 10 TBytes of data.
- e) The Subscription Server database has been populated with the subscriptions that are required to support the Distribution plan specified in A.2.5.

- f) The Science Data Server inventory database and archive have been populated with 8 hours of MODIS PGE01, PGE02, and PGE03 output granules. These granules will be used to support the first 8 hours of the Distribution plan specified in A.2.5.
- g) The Ftp Pull distribution area has been populated with at least 1,000 files linked to at least 250 directories.
- h) One or more production plans have been created to cover the 8-12 hour pretest period (see item i below) and 24 hours of production (including AM-1/PM-1 reprocessing) to be performed during the 24 hour test period (~120% of daily production requirement).
- i) MODIS Level 1 production has been initiated and has reached steady state. That is, at least 80% of the science processor cpu's allocated to ops mode are in use. To achieve this, it is estimated that processing will need to begin 8 to 12 hours prior to the start of the test due to the fact that the DPREP PGE requires three Level 0 granules before it can run and the L1A PGE takes 4 hours to execute.

## **A.2.2 Ingest Criteria**

The Ingest plan for the 24 hour test is as follows:

- a) Two MODIS Level 0 granules shall be ingested every 96 minutes from a simulated EDOS, starting at hour 0. 30 granules shall be ingested during the 24 hour period (120% of the daily average. Accounts for both AM-1 and PM-1 MODIS L0 ingest). Total data volume is 195 GB.
- b) For AM-1, one AM-1 ancillary granule shall be ingested every 96 minutes from a simulated EDOS, starting at hour 0. 15 AM-1 ancillary granules shall be ingested during the 24 hour period. For PM-1, three GBAD granules shall be ingested every 96 minutes from a simulated EDOS, starting at hour 0. 45 GBAD granules shall be ingested during the 24 hour period. Total data volume is < 1 GB.
- c) One AM1ATTF granule shall be ingested every 96 minutes from a simulated FDD, starting at hour 0. 15 granules shall be ingested during the 24 hour period (120% of the daily average). One PM-1 predicted orbit granule and 1 PM-1 definitive orbit granule shall be ingested during the 24 hour period. Total data volume is < 1 GB.
- d) Two MODIS Level 0 expedited granules shall be ingested every 30 minutes from a simulated EDOS, starting at hour 3 and ending at hour 21. 78 granules shall be ingested during the 19.5 hour period (120% of the daily average. Accounts for both AM-1 and PM-1 MODIS Level 0 expedited data). Total data volume is < 3.9 GB.
- e) One ASTER Level 0 expedited granule shall be ingested every 30 minutes from a simulated EDOS, starting at hour 3 and ending at hour 21. 39 granules shall be ingested during the 19.5 hour period (120% of the daily average). Total data volume is < 2.4 GB.
- f) One ancillary granule shall be ingested every 144 minutes from a simulated larry server, starting at hour 0. 10 granules shall be ingested. Total data volume is < 1 GB.

- g) 1 DAO granules shall be ingested every 60 minutes from a simulated DAS, starting at hour 0. 24 granules shall be ingested. Total data volume is 2 GB.
- h) 376 MODIS higher level product granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 9024 granules shall be ingested during the 24 hour period. Total data volume is 350GB.
- i) 102 MODIS higher level browse granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 2448 granules shall be ingested during the 24 hour period. Total data volume is ~ 2 GB.
- j) 48 MODIS higher level QA granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 1152 granules shall be ingested during the 24 hour period. Total data volume is < 5 GB.
- k) 376 MODIS higher level production history granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 9024 granules shall be ingested during the 24 hour period. Total data volume is < 1 GB.
- l) 4 AIRS, 3 AMSU and 3 HSB Level 0 granules shall be ingested from a simulated EDOS every 96 minutes starting at hour 0 (120% of the daily average). 150 granules shall be ingested during the 24 hour period. Total data volume is 73.5 GB.
- m) One expedited Level 0 granule for each AIRS, AMSU, and HSB shall be ingested every 30 minutes from a simulated EDOS starting at hour 3 through hour 21. 117 granules shall be ingested during the 19.5 hour period. Total data volume is 1.5 GB.

### **A.2.3 Production Criteria**

The Production plan for the 24 hour test is as follows:

- a) Perform 24 hours of DPREP processing. This requires 24 DPREP PGE executions that produce 72 output granules for AM-1, and 14 DPREP PGE executions that produce 28 output granules for PM-1. Total data volume is < 1 GB.
- b) Perform 24 hours of MODIS L1A processing for AM-1 and PM-1 and MODIS L1A reprocessing for AM-1 and PM-1. This requires 500 PGE01 executions that produce 1500 MOD01 granules and 1500 MOD03 granules. Total data volume is 564 GB.
- c) Perform 24 hours of MODIS L1B processing for AM-1 and PM-1 and MODIS L1B reprocessing for AM-1 and PM-1. This requires 1500 PGE02 executions that produce 1500 MOD02OBC granules, 1500 MOD021KM granules, 1500 MOD02HKM granules, and 1500 MOD02QKM granules. Total data volume is 1008 GB
- d) Perform 24 hours of MODIS Cloud Mask processing for AM-1 and PM-1 and MODIS Cloud Mask reprocessing for AM-1 and PM-1. This requires 1340 PGE03 executions that produce 1340 MOD35\_L2 granules and 1340 MOD07\_L2 granules. Total data volume is 101 GB.
- e) Perform 24 hours of AIRS/AMSU/HSB higher level processing and reprocessing. This requires TBD (225 in Feb 96 baseline, 5790 according to AIRS instrument team) PGE



executions that produce TBD (Appendix C of F&PRS states 1215 while AIRS instrument team's processing scenario has 8676) granules. Total data volume is TBD (282 GB in F&PRS, 184 GB according to AIRS instrument team)

#### **A.2.4 Planning Criteria**

The Planning criteria for the 24 hour test is as follows:

- a) Starting at hour 8, enter and plan the production requests required for the next 24 hours of AM-1 and PM-1 MODIS Level 1 production Reprocessing.

#### **A.2.5 Distribution Criteria**

The Distribution plan for the 24 hour test is specified in Table A-1.

#### **A.2.6 Data Access/Deletion Criteria**

The Data Access plan for the 24 hour test is as follows:

- a) Submit 45 search requests per hour from EDG against the 2,500,000 granule inventory. The search requests should be spread across 4 simulated EDG users.
- b) Submit 19 integrated browse requests per hour from the EDG against the 2,500,000 granule inventory. The browse requests should be spread across 4 simulated EDG users.
- c) 1302 granules shall be deleted from the archive every 60 minutes starting at hour 1 and ending in hour 20. A total of 26034 granules shall be deleted. This includes 16252 science, 1659 browse, 7351 PH and 772 QA granules.

#### **A.2.7 System Backup Criteria**

The System Backup plan for the 24 hour test is as follows:

- a) An incremental Sybase backup will be performed on all databases starting at hour 16.
- b) An incremental file system backup will be performed on all servers starting at the completion of the Sybase backup.

**Table A-1. GSFC Distribution Plan**

Recipient	# Orders	Source	Product(s)	Media Type	Submit Time	# Granules Per Order	Size Per Order (MB)	Total Size (GB)
MODAPS	500	Subscription	MOD02OBC	FtpPush	Ongoing	1	57	28.50
MODAPS	500	Subscription	MOD021KM	FtpPush	Ongoing	1	262	131.00
MODAPS	500	Subscription	MOD02HKM	FtpPush	Ongoing	1	168	84.00
MODAPS	500	Subscription	MOD02QKM	FtpPush	Ongoing	1	168	84.00
MODAPS	447	Subscription	MOD35_L2	FtpPush	Ongoing	1	48	21.46
MODAPS	447	Subscription	MOD07_L2	FtpPush	Ongoing	1	28	12.52
MODAPS	500	Subscription	MOD03	FtpPush	Ongoing	1	62	31.00
MODAPS	1,000	Mach/Mach	MOD02OBC	FtpPush	Ongoing	1	57	57.00
MODAPS	1,000	Mach/Mach	MOD021KM	FtpPush	Ongoing	1	262	262.00
MODAPS	1,000	Mach/Mach	MOD02HKM	FtpPush	Ongoing	1	168	168.00
MODAPS	1,000	Mach/Mach	MOD02QKM	FtpPush	Ongoing	1	168	168.00
MODAPS	894	Mach/Mach	MOD35_L2	FtpPush	Ongoing	1	48	42.91
MODAPS	894	Mach/Mach	MOD07_L2	FtpPush	Ongoing	1	28	25.03
MODAPS	1,000	Mach/Mach	MOD03	FtpPush	Ongoing	1	62	62.00
Total SIPS	10,182							1,177.42
EDC	39	Subscription	AST00_E	FtpPush	Ongoing	1	62	2.42
Total EDC	39							2.42
GDS	39	Subscription	AST00_E	FtpPush	Ongoing	1	62	2.42
Total GDS	39							2.42
Xrun1	178	EDG	MOD02OBC, MOD021KM, MOD02HKM, MOD02QKM	8mm	10 per hour starting at hour 0	4	1,965	349.77
Xrun1	16	EDG	MOD02OBC, MOD021KM, MOD02HKM, MOD02QKM	DLT	2 per hour starting at hour 8	12	5,895	94.32
Xrun1	24	EDG	TBD AIRS	CD-ROM	1 per hour starting at hour 0	2	500	12.00
Xrun1	24	EDG	TBD AIRS	8mm	1 per hour starting at hour 0	9	2,670	64.08
Total Media	242							520.17
Xrun2	720	Subscription	MOD01	FtpPush	Ongoing	1	354	254.88
Xrun1	286	EDG	MOD35_L2, MOD07_L2	FtpPull	14 per hour starting at hour 2	20	760	217.36
Xrun1	24	EDG	TBD AIRS	FtpPull	1 per hour starting at hour 0	11	3,176	76.22
Total Elect	1,030							548.46
Total User	1,272							1,068.63
Total Distribution	13,446							2,443.78

## **A.3 EDC Workload Specification**

### **A.3.1 Initial System State**

At the beginning of the 24 hour test, the system state shall be as follows:

- a) User registrations required for the test have been performed.
- b) ESDTs required for the test have been installed.
- c) Volume group assignments have been made to mirror the volume group assignments at the DAAC.
- j) The Science Data Server inventory database has been populated with 2,500,000 granules and a snapshot of the EDC Landsat 7 inventory taken around 11/1/99 (estimated at 30,000 granules). A small subset of the 2,500,000 granules will have browse associated with them. These granules will be used to support the Data Access plan specified in A.3.6. The associated archive will be populated with 10 TBytes of data.
- d) The Subscription Server database has been populated with the subscriptions that are required to support the Distribution plan specified in A.3.5.
- e) The Science Data Server inventory database and archive have been populated with 200 ASTER PGE02, PGE03, PGE04, PGE05 and PGE06 output granules. These granules will be used to support the first 8 hours of the Distribution plan specified in A.3.5.
- f) The Science Data Server inventory database and archive have been populated with 100 L70RWRS scenes. These scenes will be used to support the first 8 hours of the Distribution plan specified in A.3.5.
- g) The Ftp Pull distribution area has been populated with at least 1,000 files linked to at least 250 directories.

### **A.3.2 Ingest Criteria**

The Ingest plan for the 24 hour test is as follows:

- a) 372 ASTER L1B granules shall be ingested from D3 tape, starting at hour 0. Total data volume is 47 GB.
- b) 937 ASTER L1A granules shall be ingested from D3 tape, starting when the D3 tape drive is available following the L1B ingest. Total data volume is 116 GB.
- c) One ancillary granule shall be ingested every 120 minutes from a simulated larry server, starting at hour 0. 11 granules shall be ingested during the 24 hour period. Total data volume is < 1 GB.
- d) 3 ASTER L0 expedited granules shall be ingested every 60 minutes from a simulated GDAAC, starting at hour 3. 39 granules shall be ingested during the 24 hour period. Total data volume is < 3 GB.

- e) Approximately 84 L70R granules (F1 and F2) shall be ingested using a simulated L7 contact plan. The total number of scenes contained in these granules shall be 336.
- f) Metadata and browse for 690 IGS scenes shall be ingested, via 8 mm tape, starting at hour 8. Total data volume is < 2 GB.
- g) Metadata for 345 IGS scenes shall be ingested from a simulated SMC, via FTP pull, starting at hour 18. Total data volume is < 1 GB.
- h) 774 MODIS higher level granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 18586 granules shall be ingested during the 24 hour period. Total data volume is 925 GB.
- i) 190 MODIS higher level browse granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 4560 granules shall be ingested during the 24 hour period. Total data volume is ~ 2 GB.
- j) 95 MODIS higher level QA granules shall be ingested every 60 minutes from a simulated MODAPS interface server, starting at hour 0. 2280 granules shall be ingested during the 24 hour period. Total data volume is < 5 GB.

### **A.3.3 Production Criteria**

The Production plan for the 24 hour test is as follows:

- a) Routinely produce ASTER DST products from the ASTER L1B granules ingested from D3 tape. This requires 930 PGE02 executions that produce 2790 output granules. Total data volume is 99 GB.
- b) Process 75 on-demand requests for ASTER ACVS products. This requires 75 PGE04 executions that produce 75 AST09V granules, 75 AST09S granules, 75 AST07S granules, and 75 AST07V granules. Total data volume is 36 GB.
- c) Process 75 on-demand requests for ASTER ACT products. This requires 75 PGE05 executions that produce 75 AST09T granules. Total data volume is 1 GB.
- d) Process 75 on-demand requests for ASTER ETS products. This requires 75 PGE05 executions that produce 75 AST09T granules and 75 PGE06 executions that produce 75 AST05 granules and 75 AST08 granules. Total data volume is 2 GB.
- e) Process 75 on-demand requests for ASTER BTS products. This requires 75 PGE03 executions that produce 75 AST04 granules. Total data volume is < 1 GB.

### **A.3.4 Planning Criteria**

The planning criteria for the 24 hour test is as follows:

- a) Within the 24 hour test period, perform the planning required to produce the number of ASTER DST products specified in A.3.3.

- b) Within the 24 hour test period, perform the planning required to produce the number of ASTER on-demand products specified in A.3.3.

### A.3.5 Distribution Criteria

The Distribution plan for the 24 hour test is specified in Table A-2

**Table A-2. EDC Distribution Plan**

Recipient	# Orders	Source	Product(s)	Media Type	Submit Time	# Granules Per Order	Size Per Order (MB)	Total Size (GB)
Xrun1	10	EDG	L70RWRS	8mm	1.5 per hour starting at hour 6	1	500	5.00
Xrun1	10	EDG	L70RWRS	CDROM	1.5 per hour starting at hour 6	1	500	5.00
Xrun1	39	EDG	ASTL1A	DLT	3 per hour starting at hour 8	20	2,480	96.72
Xrun1	39	EDG	TBD MODIS	8mm	3 per hour starting at hour 0.	20	2,000	78.00
Xrun1	39	EDG	TBD MODIS	CDROM	3 per hour starting at hour 0.	20	2,000	78.00
Total Media	137							262.72
Xrun2	372	Subscription	ASTL1B	FtpPush	Ongoing	1	126	46.87
Xrun2	1,560	Subscription	TBD MODIS	FtpPush	Ongoing	1	100	156.00
Xrun1	90	ODFRM	AST9V, AST9S, AST7V, AST7S	FtpPull	5 per hour starting at hour 8	4	476	42.84
Xrun1	90	ODFRM	AST09T	FtpPull	5 per hour starting at hour 8	1	13	1.17
Xrun1	90	ODFRM	AST05, AST08	FtpPull	5 per hour starting at hour 8	2	12	1.08
Xrun1	90	ODFRM	AST04	FtpPull	5 per hour starting at hour 8	1	7	0.63
Xrun1	5	EDG	ASTL1B	FtpPull	4 per hour starting at hour 2	7	882	4.41
Xrun1	90	EDG	L70RWRS	FtpPull	6 per hour starting at hour 2	1	500	45.00
Total Network	2,387							298.00
Total Distribution	2,524							560.72

### A.3.6 Data Access/Deletion Criteria

The Data Access plan for the 24 hour test is as follows:

- a) Submit 19 search requests per hour from EDG against the 2,500,000 granule inventory. The search requests should be spread across 2 simulated EDG users.

- b) Submit 19 integrated browse requests per hour from the EDG against the 2,500,000 granule inventory. The browse requests should be spread across 2 simulated EDG users.
- c) Submit 26 search requests per hour from EDG against the Landsat 7 inventory. The search requests should be spread across 2 simulated EDG users.
- d) 1233 granules shall be deleted from the archive every 60 minutes starting at hour 1 and ending in hour 20. A total of 24661 granules shall be deleted. This includes 15036 science, 3055 browse, 5042 PH and 1528 QA granules.

### **A.3.7 System Backup Criteria**

The System Backup plan for the 24 hour test is as follows:

- a) An incremental Sybase backup will be performed on all databases starting at hour 16.
- b) An incremental file system backup will be performed on all servers starting at the completion of the Sybase backup.

## **A.4 Post-Test Reporting Requirements**

The following information shall be provided one day after each formal test:

- a) Actual work accomplished vs. planned work.
- b) List of hardware and software failures that occurred during the test.
- c) NCRs for all new defects found during the test.

The following information shall be provided two weeks after completion of both formal tests:

- a) Resource usage analysis (e.g., cpu, memory, disk I/O) for each hardware platform.
- b) Response time analysis for search and browse requests.
- c) Memory growth analysis for key servers.
- d) Recommendations for hardware and/or software configuration adjustments.

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## Appendix B. L3 and IRD Requirements

Table B-1 contains the Release 6B L3 requirements from Revision B of the December 1998 F&PRS including changes assumed by ECS for the Option A+ ECS Restructure Proposal. Interpretations of some L3 requirements are included to facilitate agreement on their meaning. Several performance/capacity requirements are included which can not be completely satisfied until the end of the contract. They will be evaluated for their applicability to Release 6B. Presently, no IRD requirements exist for 6B. Although the interpretation statements include CHEM-1 requirements, as stated in Section 3, CHEM-1 specific requirements are deferred from 6B.

**Table B-1. L3 Requirements**

L3 ID	Rel	L3 Text	Interpretation Text
DADS0190	5A 5B Partial	The ECS shall receive from the SCF the following: a. Special products (L1-L4) b. Metadata c. Ancillary data d. Calibration data e. Correlative data f. Science Software g. Standard Products (L1-L4)	The ingest of SCF data products will be supported by the SIPS interface which is further specified in SDPS0092 and SDPS0093. Special Data Products are described in the F&PRS Glossary. ECS assumes that the DAACs are responsible for creating and testing ESDTs for Special Products. The volume of Special Data Products will not impact archive capacity significantly and they will be ingested by ECS through the SIPS interface. 5A: Support to AM-1 Mission 5B: Capability to be added to support PM-1 Mission 6B: CHEM-1
DADS0260	5B Partial	The ECS shall receive non-EOS correlative and ancillary digital data.	Current: Support to AM-1 Mission 5B: Capability to be added to support PM-1 Mission
DADS0490	EOC Partial	The ECS shall archive Level 1B - Level 4 data products.	Current: Level 1B; some Level 2 - Level 4 Future: remaining Level 2 - Level 4
DADS1370	EOC Future	The ECS shall provide a mechanism for statistically monitoring both the raw and corrected bit error rate (BER) of storage media in the archive.	This requirement will only be satisfied if the FSMS COTS vendor supports this capability.
DADS2778	EOC Partial	The ECS shall be capable of receiving and archiving three days' worth of data (see Appendix C) in any given day.	One day's worth of data accounts for first time production requirements, the other two days' worth of data account for reprocessing requirements. Current: Support of intermediate contractual operational load. Future: Support of final contractual operational load.



L3 ID	Rel	L3 Text	Interpretation Text
DADS3105	5A 6A Future	The ECS shall be capable of ingesting and archiving data in support of external data production at the data rate specified in the SIPS ICD.	5A: AM-1 Data Rates 6A: PM-1 Data Rates
EOSD1060	6B Partial	The ECS shall make available to the users ECS-generated Level 2 Standard Products within 24 hours after the availability to ECS of all necessary Level 1 and other input data sets.	Current: Limited to products that can be produced with at-launch production rules and hardware phasing Future: All ECS-generated products
EOSD1070	6B Partial	The ECS shall make available to the users ECS-generated Level 3 Standard Products within 24 hours after the availability to ECS of all necessary Level 2 and other input data sets , except as approved by ESDIS.	Current: Limited to products that can be produced with at-launch production rules and hardware phasing Future: All ECS-generated products
EOSD1080	6B Partial	The ECS shall make available to the users ECS-generated Level 4 Standard Products within one week after the availability to ECS of all necessary Level 3 and other input data sets.	Current: Limited to products that can be produced with at-launch production rules and hardware phasing Future: All ECS-generated products
EOSD3750	5B 6B Partial	The ECS shall be able to recover from 95% of system failures without losing queued requests.	Disk failures and other hardware failures may result in queued requests being lost. 6B: 95% threshold for recovery from system failures.
ESN-0690	6B Partial	The ECS shall be capable of reconfiguration transparent to network users.	Future: transparent host failover
IMS-1780	6B Partial	The ECS shall respond to each user session operation within the time period specified in Table 7-1 with the specified rate of operations.	Current: Support of intermediate contractual operational load. Future: Support of final contractual operational load.
IMS-1785	6B Partial	The ECS performance specified in Table 7-1 shall be maintained during other ECS operational activities such as database updates.	Current: Support of intermediate contractual operational load. Future: Support of final contractual operational load.

L3 ID	Rel	L3 Text	Interpretation Text
PGS-0200	5B 6A 6B Partial	The ECS shall execute Science Software in accordance with the Production Rules specified by the responsible instrument team	Most of the production rules listed below have been identified to support execution of specific PGEs. Some Instrument Teams have not yet identified all of the production rules that will be required to execute their PGEs. As these Production Rules and those for CHEM-1, and PM-1 are identified, they will be added to this list and evaluated against the Production Rule budget in Option A+ for additional cost consideration. All supported Production Rules will be identified in individual L4 requirements. Current: a-s (a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s) Future: t-aa (t, u, v, w, x, y, z, aa) Where the currently identified Production Rules are: a. Basic temporal b. Advanced temporal c. Boundary offset d. Orbit-based activation f. Alternate ancillary inputs i. Spatial query l. Metadata-based query for input granules n. Minimum number of granules p. Runtime parameters q. Runtime parameter flag r. Accessing 1-233 path number t. Optional DPRs u. Most rec
PGS-0380	Future	The ECS shall be capable of generating reports related to data processing that contain the following information: a. PGE Elapsed Time b. Max Memory Use c. Number of Block input Operations d. Number of Block output Operations e. Number of Page Faults f. Number of Swaps g. PGE CPU Time	
PGS-0500	6B Partial	The ECS shall have the capability to generate Level 1 through 4 Standard Products using validated Science Software and specified data inputs provided by the scientists.	Current: Level 1 MODIS and MISR AM-1 processing; Level 2 MISR and ASTER processing Future: Level 2 thru 4 processing for PM-1, CHEM-1, and ICESAT as specified in Appendix C; and ASTER Level 1 expedited
PGS-0520	6B Partial	The ECS shall have the capability to generate data products from any single data input or combination of data inputs as required by the Science Software provided by the scientists.	
PGS-0540	6B Partial	The ECS shall have the capability to generate reprocessed data products from any original or updated single data input or combination of data inputs as required by the original or updated Science Software provided by the scientists.	Current: Level 1 MODIS and MISR AM-1 processing; Level 2 MISR and ASTER processing Future: Level 2 thru 4 processing for PM-1, CHEM-1, and ICESAT as specified in Appendix C; and ASTER Level 1 expedited

L3 ID	Rel	L3 Text	Interpretation Text
PGS-1320	6B Future	The ECS shall support the planning and execution of up to 4,000 PGEs per day at any given DAAC.	
SDPS0021	EOC Partial	The ECS shall convert ancillary data sets as identified in Appendix E from their native formats into ECS internal formats to allow access by science algorithms.	Current: Limited to at-launch product support Future: Support for all AM-products and for later missions beyond AM-1
SDPS0030	EOC Partial	The ECS shall produce Standard Products (as listed in Appendix C, including prototype products on a time-available basis) for EOS instruments based on the Science Software source code and calibration coefficients supplied by EOS scientists.	Satisfied when Production Rules, ESDTs, and SDP Toolkit enhancements are complete for future missions.
SMC-2505	Future	The ECS shall establish and maintain a local inventory data base consisting of all hardware and system software contained at the site.	Complete at Drop when XRP is turned over.

# Appendix C. Agenda for Reviews

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This appendix provides an agenda for each of the release customer reviews.

## C.1 Preliminary Agenda for IRR

1. Overview
2. Requirements
  - Mission Requirements
  - ESDT Requirements
  - Capacity Requirements
  - Release Capabilities
3. Design
  - Development Overview
  - Operations Concepts
    - Requirements Summary
    - Design Changes
    - Key Drivers
    - Hardware / Software Changes
    - Interaction Diagrams
    - End User Interactions
    - DAAC Operations Impacts
  - COTS S/W Additions and Upgrades
4. Test Engineering, Transition, & Operating System Upgrades
5. Wrap-up/Summary
  - Release Schedule
  - GFE/GFI Identified for 6B
  - Risk Areas & Mitigation Strategy
  - Review of Open Actions
  - Concluding Remarks

## **C.2 Preliminary Agenda for CSR**

1. Introduction
2. 6B System Functionality
3. 6B Test Results/Status
4. Non-Conformance Report Status
5. Physical Configuration Audit Results
6. Functional Configuration Audit Results
7. CDRL Documentation Summary
8. Post-CSR Installation and Transition
9. ECS Support to Site Readiness
10. Concluding Remarks

## **C.3 Preliminary Agenda for SRA**

1. Introduction
2. 6B Non-Conformance Report Status Since CSR
3. 6B Test Results/Status Since CSR
4. Physical Configuration Audit Results
5. 6B On-site Test Report and Readiness Assessment
6. Wrap Up

## Appendix D. Documentation

Table D-1 provides the list of documentation associated with 6B Release.

**Table D-1. List of 6B Documentation**

CDRL	DID/ Approval	Title	Science Delivery Schedule
002	102/MG1	ECS Configuration Management Plan	1 wk prior to PMR- Completed Vol 1: Completed Vol 2: Completed after update to reflect ESDIS CM Plan
008	108/MG3	Logic Network Diagrams	Electronic access
009	109/MG3	Performance Measurement Status Reports	monthly
011	111/MG3	Monthly Progress Reports	monthly
013	113/MG3	Intermediate Bar Charts	Electronic access
015	115/MG3	3 Week Window Report	Electronic access
019	119/MG3	Contractor Cost Reporting – 533 Requirements	monthly
020	120/MG3	Monthly Contractor Manpower Reporting	15 working days following end of calendar month
	222/MG3	COTS Life Cycle Cost Analysis	Semi annually in March and October
039	219/SE2 (P), 219/SE1 (F)	Interface Requirements Documents	SIPS ICD Update for Machine-to-Machine Gateway: IRR + 6 Weeks
045	304/DV1	Segment Requirements Specification	Electronic delivery (VDB)
046	305/DV3 (P) 305/DV2 (F) 305/DV2 (U/D)	Segment/ Design Specifications	Preliminary: IRR Final: CSR – 2 Weeks
050	311/DV1	Database Design and Database Schema Specifications	Final: CSR – 2 Weeks
051	313/DV3 (P), 313/DV3 (F)	ECS Internal ICDs	Preliminary: IRR Final: CSR – 2 Weeks
057	326/DV3	Monthly Tabulation of Nonconformance	Electronic delivery
062	333/DV1	PGS Toolkit Users Guide for the ECS Project	CSR – 6 Months
069	409/VE1	ECS Science Acceptance Test Plan	Preliminary IRR Final IRR + 1 Month
070	411/VE1	ECS Science Acceptance Test Procedures	Electronic delivery, IRR+5 Months

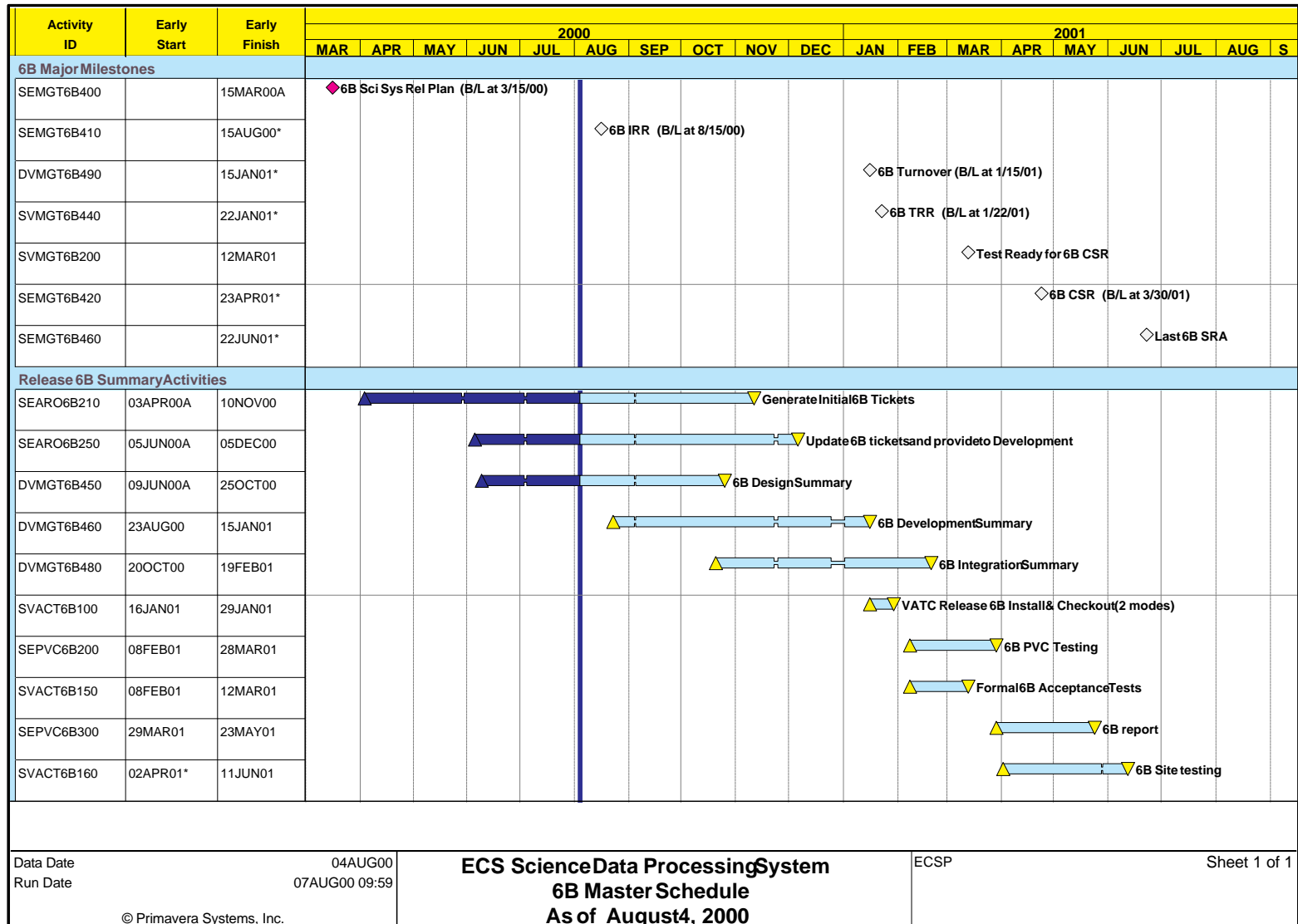
CDRL	DID/ Approval	Title	Science Delivery Schedule
071	412/VE2	ECS Science Acceptance Test Report	Electronic delivery, Preliminary: CSR + 2 Weeks, Final: SRA + 2 Weeks
081	506/PA3	Audit Reports	SRA + 30 Days
092	519/PA3	Maintainability Demonstration Test Reports	One time at completion of demonstration, within 1 month of demonstration
102	529/PA3	Malfunction/Failure Reports (MRs)	Electronic delivery
106	533/PA1	Responses to Problem Notices and Alerts	as required
107	534/PA1	Maintenance Records	on-going — available for review on request
108	535/PA1	Acceptance Data Package	SRA + 30 Days
111	603/OP1	Operational Readiness Plan	Limited to GSFC & EDC, Launch -8 months
115	608/OP1	ECS Operations Plan	Each calendar year
116	609/OP1	Operations Tools Manual	Preliminary: IRR Final: CSR – 2 Weeks
117	611/OP3	Mission Operations Procedures	CSR – 2 Weeks
129	625/OP3	Training Material	Electronic delivery, CSR – 2 Weeks
143	714/PP3	Presentation Package	IRR + 2 Weeks CSR + 2 weeks SRA + 2 weeks
147	334/DV1	Science System Release Plan	Per master schedule
148	335/DV2	COTS (hardware and software) Deployment Plan	Submit a minimum of 6 months prior to deployment of COTS

## **Appendix E. Schedule**

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This Appendix provides the schedule of major milestones for defining requirements, designing, developing, testing, and delivering 6B system.





**Figure E-1. Release 6B Schedule**